composition containing a polymer obtained by polymerizing a polymerizable unsaturated carboxylic triorganosilyl and having a number average molecular weight of 1000 to 20000, and a rosin zinc salt or a rosin derivative zinc salt.

CITATION LIST

PATENT LITERATURE

[0013]

Patent Literature 1: JP-A-2001-226440

Patent Literature 2: JP-A-2005-82725

Patent Literature 3: WO2010/071180

Patent Literature 4: JP-A-07-102193

Patent Literature 5: JP-A-10-30071

Patent Literature 6: JP-B-4340777

Patent Literature 7: WO2009/066632

SUMMARY ~~OF THE INVENTION~~

TECHNICAL PROBLEM

[0014]

However, antifouling coating compositions containing, as a hydrolyzable resin component, a homopolymer or copolymer of TIPSA or TIPSMA that are disclosed in Patent Literature 1 to 7 need to be improved in terms of their properties, as follows.

[0015]

appearance properties and adhesion and for such conventional coating compositions to exhibit satisfactory storage stability, and thus the respective properties have been under trade-off relationship among one another.

[0020]

In view of the failure to overcome the problems by such conventional antifouling coating compositions containing triisopropylsilyl(meth)acrylate polymers, the present inventors found that by allowing a copolymer of triisopropylsilyl methacrylate and triisopropylsilyl acrylate to have specific ratios of structural units derived from respective monomers, it is possible for an antifouling coating composition to have good long-term storage stability, and for a coating film formed from said coating composition to have good long-term antifouling properties and long-term water resistance, with good balance.

[0021]

That is, it is an object of the ~~present invention~~embodiments disclosed herein to provide an antifouling coating composition that is excellent in long-term storage stability and gives a coating film excellent in long-term antifouling properties and long-term water resistance.

[0021a]

In a first aspect, there is provided an antifouling coating composition comprising a silylacrylic copolymer (A) that

comprises a structural unit (1) derived from triisopropylsilyl methacrylate (i), a structural unit (2) derived from triisopropylsilyl acrylate (ii) and a structural unit (3) derived from a polymerizable monomer having a polymerizable double bond (iii), which excludes the above (i) and (ii), and satisfies the following Requirements 1 and 2;

Requirement 1: the content weight ratio ([(1)+(2)]/(3)) of the total weight ((1)+(2)) of the structural unit (1) and the structural unit (2) to the content weight of the structural unit (3) is 50/50 to 90/10; and

Requirement 2: the content weight ratio ((1)/(2)) of the content weight of the structural unit (1) to the content weight of the structural unit (2) is more than 50/50 and not more than 95/5.

[0022]

It is another object of the present ~~invention~~ disclosure to provide an antifouling coating film and an antifouling substrate that are prepared by using the coating composition and being excellent in

long-term antifouling properties and long-term water resistance; and a method for producing an antifouling substrate excellent in long-term antifouling properties and long-term water resistance.

[0022a]

In a second aspect, there is provided an antifouling coating film formed by curing the antifouling coating composition as defined above.

[0022b]

In a third aspect, there is provided an antifouling substrate formed by coating or impregnating a substrate with the antifouling coating composition as defined above, and curing the coating composition, which is used to coat or impregnate the substrate, to thereby form an antifouling coating film on the substrate.

[0022c]

In a fourth aspect, there is provided a method for producing an antifouling substrate, the method comprising coating or impregnating a substrate with the antifouling coating composition as defined above; and curing the coating composition, which is used to coat or impregnate the substrate, to thereby form an antifouling coating film on the substrate.

[0022d]

In a fifth aspect, there is provided a silylacrylic copolymer for use as a binder component of an antifouling coating

composition, the silylacrylic copolymer comprising a structural unit (1) derived from triisopropylsilyl methacrylate (i), a monomer structural unit (2) derived from triisopropylsilyl acrylate (ii) and a structural unit (3) derived from a polymerizable monomer having a polymerizable double bond (iii), which excludes the above (i) and (ii), the silylacrylic copolymer satisfying the following Requirements 1 and 2;

Requirement 1: the content weight ratio ([(1)+(2)]/(3)) of the total weight ((1)+(2)) of the structural unit (1) and the structural unit (2) to the content weight of the structural unit (3) is 50/50 to 90/10; and

Requirement 2: the content weight ratio ((1)/(2)) of the content weight of the structural unit (1) to the content weight of the structural unit (2) is more than 50/50 and not more than 95/5.

TECHNICAL SOLUTION

[0023]

The antifouling coating composition according to the present invention comprises a silylacrylic copolymer (A) that comprises a structural unit (1) derived from triisopropylsilyl methacrylate (i), a monomer structural unit (2) derived from triisopropylsilyl acrylate (ii) and a structural unit (3) derived from a polymerizable monomer having a polymerizable double bond

(iii), which excludes the above (i) and (ii), and satisfies the following Requirements 1 and 2;

Requirement 1: the content weight ratio ([(1)+(2)]/(3)) of the total weight ((1)+(2)) of the structural unit (1) and the structural unit (2) to the content weight of the structural unit (3) is 50/50 to 90/10; and

Requirement 2: the content weight ratio ((1)/(2)) of the content weight of the structural unit (1) to the content weight of the structural unit (2) is more than 50/50 and not more than 95/5.

[0024]

In the antifouling coating composition of the present